

ABSTRACT

There is provided a small-size magnetic sensor for detecting the intensity of a magnetic field in three axial directions, in which a plurality of giant magnetoresistive elements are formed on a single semiconductor substrate. A thick film is formed on the semiconductor substrate; giant magnetoresistive elements forming an X-axis sensor and a Y-axis sensor are formed on a planar surface thereof; and giant magnetoresistive elements forming a Z-axis sensor are formed using slopes of channels formed in the thick film. Regarding the channel formation, it is possible to use the reactive ion etching and high-density plasma CVD methods. In addition, an insulating film is formed between the thick film and passivation film and is used as an etching stopper. Each of the slopes of the channels can be constituted of a first slope and a second slope, so that a magneto-sensitive element is formed on the second slope having a larger inclination angle. In order to optimize the slope shape and inclination with respect to each channel, it is possible to form a dummy slope that does not directly relate to the formation of the giant magnetoresistive elements.